

Paul V. Klimov

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Career Goals

My career goal is to become an experimental physicist. At present, I am working towards a Bachelor of Science degree in Physics, with a minor in Mathematics. After I receive these degrees, I hope to attend graduate school to study condensed matter physics. I am interested in this field because it has numerous unresolved fundamental problems, and solutions to these problems could help address some modern-day societal issues.

Education

University of New Mexico, Albuquerque, NM
Bachelor of Science in Physics, expected May 2010
Credits earned: 136
Cumulative GPA: 4.14/4.00 (A+=4.33)
Physics Subject GRE: 990/990

Advanced Coursework

Physics: Analytical Mechanics I & II, Statistical Mechanics, Introductory Special Relativity and Quantum Mechanics, Optics Lab, Junior Lab I & II, Computational Physics (MATLAB & Maple), Electrodynamics I & II, Quantum Mechanics I, Mathematical Methods in Theoretical Physics I. In Progress: Quantum Mechanics II, Chemistry and Physics at the Nanoscale, and Contemporary Physics Lab.

Mathematics: Linear Algebra, Honors Calculus, Ordinary Differential Equations, Partial Differential Equations, Vector Analysis, and Advanced Calculus. In Progress: Complex Analysis

Chemistry: Organic Chemistry I and II, and two Organic Synthesis Labs.

Biology: Molecular Biology, Molecular Genetics, Ecology and Evolution, and accompanying Labs.

Technical Internships

Sandia National Laboratories, Center for Integrated Nanotechnologies

Fall 2009 – Present (~10–15 hrs/ week during school year)

Mentor: Dale Huber, PhD.

My mentor and I are investigating how the crystalline structure of iron and how the binding of various organic surfactants at the particle surface affects the magnetic properties of iron nanoparticles. This investigation is focused on the interpretation of measurements from nuclear magnetic resonance (NMR), X-ray magnetic circular dichroism (XMCD) and X-ray absorption fine-structure experiments (XAFS), as well as Fourier-transform infrared (FT-IR) and possibly X-ray photoelectron spectroscopies. We also plan to incorporate measurements from electron paramagnetic resonance and Mössbauer spectroscopies, which will be obtained with the help of our collaborators.

Columbia University, Nanoscale Science and Engineering Center

Summer 2009 (40 hrs/week)

Mentor: Tony Heinz, PhD

In this REU, I studied the stacking configuration of graphene sheets in trilayer graphene. By monitoring the 2D Raman mode in various samples, I was able to identify a feature that can allow one to distinguish between these stacking orders. In addition to preparing graphene samples and taking spectroscopic data, I wrote a program in MATLAB that identifies this 2D-mode feature, calculates various asymmetry parameters from a fitting algorithm that I coded, and maps different stacking regions based on two-dimensional Raman mapping data. (See my website for the full final report and my MATLAB program: http://openwetware.org/wiki/User:Paul_V_Klimov)

Sandia National Laboratories, Center for Integrated Nanotechnologies

Fall 2007 – Summer 2009 (~10–15hrs/week during school year and 40hrs/week during Summer)

Mentor: Dale Huber, PhD.

In this internship, I chemically modified the surfaces of iron and iron oxide nanoparticles in attempt to produce novel magnetic properties. I often worked in a glove box or with a Schlenk line to prevent the oxidation of metallic iron. To characterize these materials, I used FT-IR, UV-Vis, and dynamic light scattering (DLS). In addition, I briefly analyzed super conducting quantum interference device (SQUID) measurements and transmission electron

microscope images, for these nanoparticles. In a side project, I engineered iron oxide nanoparticles with polyethylene glycol diacid for use in the attempted treatment of Alzheimer's disease.

Los Alamos National Laboratory, Center for Integrated Nanotechnologies

Summer 2007 (40 hrs/week)

Mentor: Sergei Ivanov, PhD.

In this internship, I studied the physical and chemical properties of CdSe and CdTe semiconductor quantum dots and conducted surface exchange reactions in order to improve their light emitting properties. I investigated the effect of ligand binding on the emission and absorption spectra of these particles by using UV-Vis and photoluminescence (PL) spectroscopy.

Los Alamos National Laboratory, Center for Nonlinear Studies

Summer 2006 (40 hrs/week)

Mentor: Donald Thompson

My primary task was to build computers, to diagnose and fix hardware problems, and to set up computing clusters.

Los Alamos National Laboratory, Center for Nonlinear Studies

Summer 2005 (40hrs/week)

Mentor: Zoltan Torozckai, PhD.

My primary task was to develop a webpage for the Center for Nonlinear Studies using HTML and basic php.

Laboratory Skills

Bench-top, cleanroom, and air-sensitive (glove box and Schlenk line) chemistry
PL, DLS, UV-Vis, Raman and FT-IR. Future: NMR, XPS, XMCD, and EXAFS.

Computer Skills

MATLAB (advanced; See my website for my programs: http://openwetware.org/wiki/User:Paul_V_Klimov)
Maple (intermediate)
Mathematica (intermediate)
LabVIEW (intermediate-basic)
HTML and php (basic)

Language Skills

Bilingual in English and Russian. I used to be fluent in German and have very basic knowledge of Spanish.

Honors and Awards

NSF REU Fellowship at Columbia University *Summer 2009*
Kappa Mu Epsilon National Mathematics Honor Society *Fall 2008 – present*
Edward Grisso Scholarship *Fall 2007*
Phi Kappa Phi Honor Society *Spring 2007 - present*
Golden Key National Honor Society *Spring 2007 - present*
NSCS Honor Society *Spring 2006 – present*
Phi Eta Sigma Honor Society *Spring 2006 - present*
UNM Lottery Scholarship *Spring 2006 - present*
Dean's List *Fall 2005 – present*
UNM Bridge to Success Scholarship *Fall 2005*

Pending Fellowships

DOE, SPS, NDSEG, and Hertz (advanced to interview stage)

References

Dale Huber, PhD. *Sandia National Laboratories*
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